REMARKS

Claims 1, 3, 4, 6, and 8-11, are presently pending in the application. Claims 2, 5, 7, and 9 have been previously cancelled without prejudice or disclaimer, and Claims 10-11 added. Reconsideration and allowance of all claims are respectfully requested in view of the following remarks.

The Examiner is respectfully requested to acknowledge one (1) sheet of Corrected Formal Drawings, which adds the legend --Prior Art-- to Figs. 1A and 1B, as approved by the Examiner in the Office Action dated March 6, 2003.

The Examiner has rejected Claims 1, 3, 4, and 8, under 35 U.S.C. §103 as being unpatentable over the Applicants' Prior Art (APA) (Fig. 1B). Claims 1, 3, 4, and 6-8 have been rejected under 35 U.S.C. §103 as being unpatentable over Sakamoto et al. For the following reasons, the prior art rejections are respectfully traversed.

The Applicants respectfully submit that neither the APA nor Sakamoto et al. teaches or suggesta semiconductor device having a photodiode wherein when inverse biases are applied to said first conductivity type second semiconductor layer and said second conductivity type semiconductor layer, a depletion layer is spread to a region between a first predetermined amount and a second predetermined amount in a depth direction from a surface of said second conductivity type semiconductor layer, such that a sensitivity of said photo diode to light of a first wavelength and a sensitivity of light of a second wavelength, which is different from said first wavelength, are made substantially the same, as recited in amended Claim 1.

Rather, since the APA is directed to a conventional photo diode which is optimized for light at a particular wavelength (see page 3, line 12, to page 4, line 2, of the present specification), the APA does not disclose or suggest that when the depletion layer is spread to a region between a first and second predetermined amount (3-6 or 2-7 μm as claimed in Claims 3-4) from the surface of the second conductivity type semiconductor layer (n-type semiconductor layer 12), the sensitivity of the photo diode to light of a first and a second wavelength, which are different from one another (i.e., 650 nm and 780 nm for a CD or DVD apparatus, as claimed in Claim 8), can be made substantially the same (see pages 14-15

of the present specification). FIG. 1B does not show that the conventional photo diode is directed to light at a particular wavelength, and thus, the Examiner is incorrect in assuming that since the Figures appear similar that the structure of the device is similar also.

Further, Sakamoto et al. do not disclose or suggest a photo diode directed to receiving two wavelengths for a CD and DVD application (i.e., 650 nm, and 780 nm as claimed in Claim 8) as in the present invention as claimed in Claim 1. The Examiner is reading into Sakamoto et al. these limitations, as Sakamoto et al. is similar to the APA in that it appears to be directed to light of a particular wavelength. This is supported by col. 10, lines 2-9, where Sakamoto et al. disclose that the depth of the pin diode is easily controlled for maximum light absorption without affecting the surface layer, and that the buried layer or intrinsically doped layer can be made thicker to accommodate longer wavelengths. There is no single structure in Sakamoto et al. that is directed to receiving light of two wavelengths for a CD and DVD application.

Accordingly, Claim 1, as well as Claims 3-4 and 8, are not obvious over either the APA or Sakamoto et al., and the rejection of Claims 1 3-4 and 8 under 35 U.S.C. §103 should be withdrawn.

With respect to new Claim 10, neither the APA nor Sakamoto et al. teach or suggest a semiconductor device having a photo diode having a three layer structure including a p-type semiconductor substrate having a surface impurity concentration ranging from about $1 \times 10^{17}/cm^3$ to $1 \times 10^{19}/cm^3$ (or at least $1 \times 10^{17}/cm^3$, as recited in Claim 6), a p-type semiconductor layer having an impurity concentration of about $5 \times 10^{13}/cm^3$ and formed on said p-type semiconductor substrate; and an n-type semiconductor layer having an impurity concentration of about $1 \times 10^{15}/cm^3$ and formed on said p-type semiconductor layer, wherein an end face of a depletion layer on a side of said p-type semiconductor substrate and a surface layer of said p-type semiconductor layer are within no more than a predetermined distance when inverse biases are applied to said p-type semiconductor layer and said n-type semiconductor layer, such that a sensitivity of said photo diode to light of a first wavelength and a sensitivity of light of a second wavelength, which is different from said first wavelength, are made substantially the same.

First, the APA does not teach or suggest any restriction of the impurity concentration levels of the three layer structure, which would result in an end face of a depletion layer on a side of the p-type semiconductor substrate and a surface layer of the p-type semiconductor layer being within no more than a predetermined distance when inverse biases are applied, making the sensitivity to light of two wavelengths substantially the same. The APA is silent with respect to these feature.

Second, Sakamoto et al. disclose a different structure entirely - that of a four layer structure (see FIG. 4), with n-type epitaxial layer 44, an n-type buried layer region 47, n-type buried layer 43, intrinsically doped region 46, an intrinsically doped (p type or n-type) layer 42, and a p-type substrate 41. Sakamoto et al. do not disclose or suggest the impurity concentration of the substrate 41, which is required to range from about $1 \times 10^{17}/cm^3$ to $1 \times 10^{19}/cm^3$ in the present invention as claimed in Claim 10. Further, only buried layer 43 is disclosed as having an impurity concentration greater than $1 \times 10^{17}/cm^3$.

Accordingly, Claim 10, as well as Claim 6, are not obvious over either the APA or Sakamoto et al., and the rejection of Claims 10 and 6 under 35 U.S.C. §103 should be withdrawn.

With respect to new Claim 11, neither the APA nor Sakamoto et al. teaches or suggests a semiconductor device having a photo diode, wherein when inverse biases are applied to the first conductivity type second semiconductor layer and the second conductivity type semiconductor layer, an end face of a depletion layer on a side of the first conductivity type first semiconductor layer, and a surface layer of the first conductivity type first semiconductor layer are brought within no more than 3 μm, forming a space layer, such that a sensitivity of the photo diode to light of a first wavelength and a sensitivity of light of a second wavelength, which is different from said first wavelength, are made substantially the same.

As stated above, with respect to Claim 10, the APA does not teach or suggest such a space layer of a predetermined amount formed when inverse biases are applied, making the sensitivity to light of two wavelengths substantially the same. The APA is silent with respect to these feature.

The Sakamoto et al. reference is also silent with respect to such a space layer.

Accordingly, Claim 11 is not obvious over either the APA or Sakamoto et al., and the rejection of Claim 11 under 35 U.S.C. §103 should be withdrawn.

If the Examiner believes that there is any issue which could be resolved by a telephone or personal interview, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number listed below.

Applicant hereby petitions for any extension of time which may be required to maintain the pendency of this case, and any required fee for such an extension is to be charged to Deposit Account No. 19-3140.

Respectfully submitted,

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